

WHAT IS CLAIMED IS:

1. An apparatus for a dry end of a papermaking machine having a dryer for drying a paper web, the apparatus comprising:

5 a stabilizing foil assembly for supporting and stabilizing the paper web exiting the dryer, the foil assembly having an upstream edge and a downstream edge; and

10 a driven reel spool for winding the paper web thereon, the reel spool being positioned such that the downstream edge of the foil assembly forms a nip with a growing paper roll wound on the reel spool, the reel spool and foil assembly being relatively movable for controlling a nip load at the nip.

2. The apparatus of claim 1, further comprising a measuring sensor for measuring one or more properties of the paper web downstream of the dryer roll, the measuring sensor being supported adjacent the foil assembly.

15 3. The apparatus of claim 2, wherein the measuring sensor is supported by the foil assembly.

4. The apparatus of claim 2, wherein the measuring sensor is supported by a fixed structure positioned proximate the foil assembly.

20 5. The apparatus of claim 2, wherein the measuring sensor is traversable along a cross-machine direction for measuring properties of the paper web at various locations spaced apart in the cross-machine direction.

6. The apparatus of claim 1, wherein the foil assembly is pivotable about a pivot axis for varying the nip load.

7. The apparatus of claim 1, wherein the foil assembly includes a flexible edge portion defining said edge in contact with the paper roll.

25 8. The apparatus of claim 7, wherein the foil assembly comprises a single foil having the flexible edge portion.

9. The apparatus of claim 7, wherein the foil assembly comprises a plurality of foils, a downstream one of the foils having the flexible edge portion.

10. The apparatus of claim 7, further comprising a movable support member backing up the flexible edge portion of the foil assembly, the movable support  
5 member being movable relative to the paper roll for controlling the nip load.

11. An apparatus for a dry end of a papermaking machine having a dryer for drying a paper web, the apparatus comprising:

a stabilizing foil for supporting and stabilizing the paper web exiting the dryer, the foil having an upstream end adjacent the dryer; and

10 a measuring sensor for measuring one or more properties of the paper web downstream of the dryer, the measuring sensor being integrated into the foil.

12. The apparatus of claim 11, wherein the measuring sensor is traversable in a cross-machine direction for measuring properties of the paper web at various locations spaced apart in the cross-machine direction.

15 13. The apparatus of claim 12, wherein the web is supported by one side of the foil and the measuring sensor is mounted on an opposite side of the foil, the foil defining a slot therethrough extending in the cross-machine direction and the measuring sensor being aligned with the slot and traversable along the slot.

20 14. The apparatus of claim 13, further comprising a movable cover for covering the slot when the measuring sensor is not being used.

15. An apparatus for a dry end of a papermaking machine having a dryer for drying a paper web, the apparatus comprising:

a rotatable reel spool for winding the paper web thereon located downstream of the dryer;

25 a rotatable reel drum mounted adjacent the reel spool so as to form a nip with a growing paper roll wound on the reel spool, the paper web being supported and guided onto the paper roll by the reel drum; and

a calendering belt forming a calendering nip with the reel drum for calendering the paper web, the paper web passing through the calendering nip prior to being wound onto the paper roll.

5 16. The apparatus of claim 15, wherein the calendering belt is stretched between at least a pair of spaced-apart guide rolls.

17. The apparatus of claim 16, wherein one or more of the reel drum, reel spool, and guide rolls is rotatably motor-driven.

10 18. A dry end of a papermaking machine, the dry end comprising:  
a dryer for drying a paper web;  
a rotatably driven reel spool for winding the paper web thereon located downstream of the dryer and close-coupled thereto; and  
a winding support belt stretched between at least a pair of spaced-apart guide rolls and supporting the reel spool and a paper roll wound thereon, the belt forming a nip with the paper roll.

15 19. The dry end of claim 18, further comprising:  
a stabilizing foil for supporting and stabilizing the paper web exiting from the dryer, the foil having an upstream end adjacent the dryer and a downstream end proximate the nip such that the paper web is stabilized by the foil between the dryer and the nip.

20 20. The dry end of claim 19, wherein the dryer comprises a rotating dryer roll and the reel spool rotates in the same direction as the dryer roll, the foil guiding the paper web from the downstream end of the foil onto the paper roll generally at an upper side of the paper roll.

25 21. The dry end of claim 19, wherein the dryer comprises a rotating dryer roll and the reel spool rotates in an opposite direction from the dryer roll, the foil guiding the paper web from the downstream end of the foil onto the paper roll generally at a lower side of the paper roll.

22. An apparatus for a dry end of a papermaking machine having a dryer for drying a paper web, the apparatus comprising:

a rotatably driven reel spool for winding the paper web thereon located downstream of the dryer; and

5 a belt running in a loop about a plurality of guide rolls, a first of the guide rolls being positioned proximate the dryer and spaced upstream of a growing paper roll wound on the reel spool, a second of the guide rolls being positioned adjacent the paper roll such that a portion of the loop of the belt between the first and second guide rolls extends from a location proximate the dryer to the paper roll, said  
10 portion of the loop stabilizing the paper web as the paper web travels from the dryer to the paper roll.

23. The apparatus of claim 22, further comprising a device for creating an underpressure disposed within the loop of the belt, and wherein the belt is permeable.

24. A reel-up for a paper making machine, comprising:

15 a rotatably driven reel drum having a rotation axis;  
at least one reel spool for winding a paper web thereonto; and  
a winding support for supporting the reel spool during a winding operation, the winding support comprising a holder connected with a pivot arrangement that defines a pivot axis about which the holder is rotatable, one portion  
20 of the holder being structured and arranged to support the reel spool and permit rotation of the reel spool during a winding process, the pivot arrangement being movable so as to move the pivot axis of the holder relative to the rotation axis of the reel drum for placing the reel spool held in the holder in a winding position to form a nip with the reel drum and for controlling a nip load in the nip.

25 25. The reel-up of claim 24, wherein the holder is pivotable about the pivot axis so as to move a fully wound paper roll held in the holder away from the reel drum to allow a new empty reel spool to be moved into the winding position.

26. The reel-up of claim 25, further comprising supports for supporting the fully wound paper roll, the supports being positioned relative to the holder such that

the holder can be pivoted into a position for releasing the fully wound paper roll held in the holder onto the supports.

27. The reel-up of claim 24, wherein the pivot arrangement for the holder is movable relative to the reel drum in at least one direction generally perpendicular to a rotation axis of the reel drum.

28. The reel-up of claim 24, wherein the pivot arrangement for the holder is movable vertically and horizontally.

29. A method for reeling a traveling paper web, comprising:  
supporting the traveling web on an outer envelope surface of a rotating reel drum;  
disposing a rotating reel spool in a winding position so as to form a nip with the reel drum such that the web passes through the nip and is wound onto the reel spool to form a paper roll thereon;  
supporting the reel spool in the winding position by a holder connected with a pivot arrangement defining a pivot axis about which the holder is rotatable, wherein the holder positions the reel spool in the winding position such that rotation axes of the reel spool and the reel drum are in a common plane; and  
controlling nip load by performing at least one of (1) moving the pivot arrangement with a component of movement that is parallel to said common plane, and (2) applying a moment on the holder about the pivot axis.

30. The method of claim 29, further comprising  
providing supports for supporting a fully wound paper roll so that the fully wound paper roll can be moved along the supports away from the winding position, the supports being located at a different vertical level from the winding position; and

rotating the holder about the pivot arrangement to move the paper roll out of the winding position away from the reel drum when the paper roll is fully wound, and releasing the fully wound paper roll from the holder onto the supports.

31. The method of claim 30, further comprising moving an empty reel spool into proximity with the reel drum as the holder rotates the fully wound reel spool out of the winding position, and causing the web to be severed and start winding onto the empty reel spool.

5           32. The method of claim 31, wherein the empty reel spool has a tubular side wall perforated with holes communicating with an interior of the empty reel spool, and wherein a vacuum is created in the interior of the empty reel spool to cause the paper web to be suctioned against the empty reel spool at the start of winding.

10           33. A composite shaftless core, comprising:  
a tubular spool portion formed of a fiber-matrix composite material,  
the spool portion having opposite ends; and  
a metal end fitting attached to each end of the spool portion to facilitate  
handling of the composite shaftless core.

15           34. The composite shaftless core of claim 33, wherein the spool portion is perforated with holes such that air is drawn inwardly through the holes when a vacuum is exerted in the interior of the spool portion.

            35. The composite shaftless core of claim 33, wherein at least one of the end fittings has splines formed along an inwardly facing surface thereof for engagement with a drive unit for center-driving of the shaft.

20           36. The composite shaftless core of claim 33, wherein each end fitting has an annular groove formed along an outer surface thereof.

            37. A method for winding a traveling paper web after the web exits from a dryer, the method comprising:  
disposing a stabilizing foil after the dryer and using the foil to stabilize  
25 the traveling web as the web travels downstream from the dryer;  
positioning the foil such that a downstream edge of the foil forms a nip with a rotating paper roll onto which the web is wound; and

passing the web through the nip as the web is wound onto the paper roll.

38. The method of claim 37, wherein the foil is disposed such that an upstream edge of the foil is adjacent the dryer.

5           39. A paper machine, comprising:  
            a forming section for forming a wet paper web;  
            a drying section for drying the wet paper web, the drying section  
including at least one through-air dryer (TAD) comprising a foraminous dryer roll and  
a TAD fabric arranged in an endless loop about guide rolls such that the TAD fabric  
10          passes about the dryer roll, the TAD fabric being arranged to receive the wet paper  
web and carry the web about the dryer roll; and  
            a reel-up located after the through-air dryer for winding the paper web  
onto a rotating reel spool, the TAD fabric downstream of the dryer roll forming a nip  
with the reel spool such that the paper web carried by the TAD fabric passes through  
15          the nip and winds onto the reel spool to form a paper roll.

            40. The paper machine of claim 39, wherein the forming section includes a  
wire on which the paper web is carried to a web transfer point at which the paper web  
is transferred from the wire onto the TAD fabric.